Dynamics and Hydrostatics, with practical work. Candidates must send their names, with testimonials of good conduct and certificate of birth, on or before Tuesday, October 25, to one of the tutors, the Rev. E. S. Roberts or Dr. J. S. Reid.

THE Anderson travelling scholarship at Aberdeen University, value 170*l.*, tenable for two years, has been awarded to Mr. J. J. R. Macleod.

DR. WM. DUANE has been appointed professor of physics in the University of Colorado. He takes the place of Prof. W. J. Waggener, who has resigned owing to failing health.

THE building of a new museum of archæology for the University of Pennsylvania was begun in January last. Its cost will be about 100,000*l.*, and it will be completed, it is hoped, early next year.

Science states that the sum of 21,000 dollars has been given by Mr. George A. Fowler, of Kansas City, to cover the cost of re-building the agricultural department buildings of the University of Kansas, recently destroyed by fire.

THE following appointments have been made at the Johns Hopkins University:—Associate Prof. J. S. Ames to be professor of physics; Drs. T. C. Gilchrist and J. W. Lord to be clinical professors of dermatology.

DR. A. M. STALKER has been appointed professor of medicine, and Dr. S. MacEwan professor of surgery at Dundee University College. Lectureships in the same college in forensic medicine and public health, and physiology have, respectively, been conferred upon Dr. C. Templeman and Dr. F. Harris.

UNIVERSITY OF LONDON.—The following have passed in the recent D.Sc. examination:—In Experimental Physics—Robert Alfred Lehfeldt, Alfred Stansfield, Joseph Herbert Vincent. In Chemistry—Samuel Barnett Schryver, Morris William Travers. In Botany—Arthur Harry Church, Reginald William Phillips, Alfred Barton Rendle. In Zoology—Marion Isabel Newbigin, Ernest Warren. In Physiology—Jn. Le Mare Bunch, Otto Fritz Frankau Grünbaum. In Geology and Physical Geography—Catherine Alice Raisin. In Mental and Moral Science—Jessie Charles.

A PETITION is about to be presented to the House of Commons by the Association of School Boards, acting for a large number of School Boards in England and Wales, with reference to the action of the Science and Art Department in the appointment of local authorities for secondary education. The petition represents that School Boards have hitherto been recognised by the Science and Art Department as local committees eligible to receive grants from the Department, but recently, in appointing local authorities for the distribution of the grants within certain areas, a large number of the Technical Instruction Committees of County and County Borough Councils have been recognised by the Department as being responsible for the science and art instruction within the areas of such Committees, and to these local authorities will be entrusted the distribution of money voted by Parliament for science and art instruction. These local authorities are thus being invested with many of the important administrative powers of local authorities for secondary education, and the Science and Art Department, it is urged, are carrying into effect without legislation an arrangement that was proposed in the case of the Education Department and of the Science and Art Department by the Education Bill of 1896, which was successfully opposed and withdrawn. In the opinion of the Association the action of the Science and Art Department is a serious interference with the powers of School Boards and of managers of voluntary schools; it forestalls imminent legislation, since a Government measure for secondary education is shortly to be introduced into Parliament; and it disregards the absolute necessity which is universally felt for correlating all educational machinery, and is in direct opposition to the recommendations of the recent Royal Commission on Secondary Education. The petitioners request that steps be taken to secure that the Science and Art Department in making the appointment of local authorities dealing with science and art grants under Clause 7 of the Science and Art Directory, if permitted at all, shall act in accordance with the Association's recommendations, which are stated to be almost identical with those of the Royal Commission.

SCIENTIFIC SERIALS.

Bulletin of the American Mathematical Society, June 1898.—The regular meeting, held on April 30, was largely attended. In addition to the presentation of some thirteen papers, a slight amendment was made in the by-laws to provide for life-membership.—The following five papers were read at the meeting:—Example of a single-valued function with a natural boundary, whose inverse is also single-valued, by Prof. Osgood. It is first shown that functions exist which are analytic within the unit circle, which have the unit circle as a natural boundary, and which take on no value more than once. Then an explicit example is taken, viz. the series

$$f(z) = z + \frac{z^{a+2}}{(a+1)(a+2)} + \frac{z^{a^2+2}}{(a^2+1)(a^2+2)} + \dots$$

where a denotes an integer greater than unity. This example is discussed and illustrated.—Note on Poisson's integral, by Prof. Bôcher. A non-artificial proof is given, and the theorem generalised by inversion, whence results the theorem, If (x, y) is any point within the circle C,

$$V(x, y) = \frac{1}{2\pi}\int_0^{2\pi} V_c d\psi,$$

(A) where ψ is the angle measured from a fixed circle through (x, y) which cuts C orthogonally to a variable circle of the same sort. Hence is derived the further theorem, given a continuous function V_c upon the circumference of the circle C, the function $V(x, y)$ defined by (A) throughout the interior of C is harmonic throughout C, and joins on continuously to the values V_c on the circumference. [From a theorem of Gauss the value of V at the centre (x_0, y_0) of C is the arithmetic mean of its values on the circumference. If V_c denotes the values of V on the circumference, and ϕ is the angle at the centre, we have

$$V(x_0, y_0) = \frac{1}{2\pi}\int_0^{2\pi} V_c d\phi].$$

—On the polynomials of Stieltjes, by Prof. van Vleck. Such a polynomial is defined to be one which satisfies the regular differential equation of the second order.

$$\frac{d^2y}{dx^2} + \left(\frac{1-\lambda_1}{x-e_1} + \dots + \frac{1-\lambda_r}{x-e_r}\right)\frac{dy}{dx} + \frac{\phi(x)[= A_0x^{r-2} + A_1x^{r-3} + \dots + A_{r-2}]}{(x-e_1)\dots(x-e_r)} = 0.$$

—Note on Stokes's theorem in curvilinear coordinates, by Prof. A. G. Webster.—Is continuity of space necessary to Euclid's geometry, by W. M. Strong. The space is thus defined: Let a real number which can be obtained from the integers by a finite number of rational operations and extractions of square roots be called a *quadratic number*. A, B, C are any three points not in a straight line. Such that AC and BC are quadratic in terms of AB. The points whose distances from each of the three points A, B, C, are quadratic in AB, constitute the space (*i.e.* quadratic space). In such a space it is shown that figures may be moved about without change of size or shape. Two other striking peculiarities are—two circumferences may intersect in a single point, and a circumference may have no centre.—A short note on the Steiner points of Pascal's hexagon, by Dr. Snyder, gives a short and simple proof of the conjugate nature of M, N with regard to the conic for which M, N are associated Steiner points (*cf.* Von Staudt, "Ueber die Steiner'schen Gegenpunkte," Crelle, vol. lxii.). In this proof the author claims that it is clearly shown which of Steiner's points are associated as "Gegenpunkte."—There are two reviews, viz. of the "Cours de Géométrie Analytique of Niewenglowski," by Prof. Bôcher, and of Goursat's "Partial Differential Equations," by Prof. E. O. Lovett (thirty-five pages).—The notes give the mathematical courses for the summer semester at the Universities of Berlin, Göttingen, Leipsig, Munich, Columbia, Chicago, and Harvard.—At the end is given the usual list of new publications.

Symons's Monthly Meteorological Magazine, July.—The principal article contains some account, by Mr. Rotch, of the recent International Aeronautical Conference at Strassburg, which was well attended. The methods discussed for obtaining observations were manned and unmanned balloons, the captive kite-balloon, and kites.—M. Cailletet described his apparatus for photographing automatically at fixed invervals a barometer in the balloon and the ground vertically below, so that the

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height and route of the balloon may be determined. He also exhibited a very sensitive thermometer having a spiral silver tube for its bulb soldered to a glass tube, both being filled with the liquid toluene.—M. Teisserenc also showed a very sensitive self-recording thermometer which is, at the same time, almost insensible to shocks.—Mr. Rotch read a paper on the use of kites, based on the experiments carried on at Blue Hill Observatory. The Conference recommended their use as being of great value to meteorology. Trials were made with the kite-balloon, a captive balloon which, unlike the ordinary spherical one, is not driven down or carried away by strong winds. It is a German invention, and is used in the army for reconnoitring. The Strassburg balloon, which is of smaller construction, is the first adapted for lifting self-recording meteorological instruments.—Results of meteorological observations for June at Camden Square (London) for forty years, 1858-97. The mean of all the maximum temperatures is 71°·3, and of the minimum, 50°·9. The mean rainfall is 2·23 inches; in June of the present year the total fall was 1·11 inches only.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Microscopical Society, June 15.—Mr. E. M. Nelson, President, in the chair.—The President referred to the loss the Society had experienced in the death of Mr. Henry Perigal, who died at the advanced age of ninety-eight. He then exhibited and described two old microscopes, one of which, made by Benjamin Martin, probably dated from about 1770. It had two concave mirrors, one of 4″ and the other of 9″ focus. The optical part was curious, having a fixed back lens in the tube which was common to all the objectives, each of which was fitted with a lieberkuhn. The other was an antique instrument with simple lenses fitting into one another to increase the power. It seemed to be a copy of one made by Mann and Ashcroft somewhere about 1740, and was made by Cary. He next called attention to an excellent lithographic portrait of Prof. John Quekett, the work of Wm. Lens Aldous, whose son had presented it to the Society.—Mr. Frederick Ives exhibited a camera lucida which he had devised. It was one he had obtained from Messrs. Swift, and he had slightly modified it by depositing on one of the inside faces of the compound prism a very thin specular film of silver, through which it was possible to see the pencil without having to centre the eye, as was the case where the film was opaque with a small hole in it to look through. After some remarks by Mr. Beck, Mr. Swift said there was a difficulty in centring the eye in the old form which did not exist in the one before them, the pencil being seen with ease while delineating the object under observation. The President thought the device a valuable one, and preferable to that of a thick film of silver with a hole in it.—Mr. Ives also exhibited a monochromatic green screen, consisting of dyed films between two plates of glass, which he thought possessed advantages over liquid screens. The one now shown would cut off all beyond the F line on the blue side, including the ultra-violet, and also all red and yellow. In reply to an inquiry, Mr. Ives said that of course the light was not strictly monochromatic; it was a mixture of pure green in the spectrum at the E line, with some yellow-green on one side and blue-green on the other.—Mr. B. W. Priest exhibited a large number of slides of sponges. He said he had brought a selection which would be found to be characteristic of the order Calcarea and the three sub-orders of Silicea, viz. the Monaxonidæ, Tetractinellidæ and Hexactinellidæ, to the last of which he directed attention on account of their great beauty. There were also some slides of fresh-water sponges.—The Secretary said there was a paper of great interest, namely, the continuation of Mr. Millett's report on the Foraminifera of the Malay Archipelago, which being of a very technical character he proposed should be taken as read.—The President reminded the Fellows present that the next meeting of the Society would not take place until October 19.

Mineralogical Society, June 21.—Prof. A. H. Church, F.R.S., Vice-President, in the chair.—Prof. Miers communicated an account of some minute cubic crystals of lead developed by the action of acid upon the surface of cast lead. These, although too small to be isolated and measured individually, were successfully measured by means of the new double-circle or "theodolite"-goniometer, by which all the faces of a complicated crystal may be determined in a single operation.—Mr. E. G. J. Hartley read an account of an analysis of Cornish Chalcophyllite, carried out in the Mineralogical Laboratory at Oxford. This mineral, hitherto supposed to be a basic arsenate of copper and aluminium, he found to contain no less than 7 per cent. of SO_3, which has been overlooked by previous analysts, so that Chalcophyllite must now be classed among the double arsenates and sulphates.—Mr. G. F. H. Smith gave a short account of a possible dimorphous form of Laurionite. In general appearance this mineral is very similar to Laurionite, but on crystallographic and optical examination was found to be monosymmetric, imitating rhombic symmetry by twinning; whereas Laurionite is truly rhombic. From an analysis, made on a small quantity of selected material, Mr. G. T. Prior found the chemical composition to be the same as that of Laurionite.—Mr. Tutton exhibited a new dilatometer designed for the purpose of measuring the thermal dilatation of crystals by Fizeau's delicate method. In this instrument the expansion of the platinum-iridium screws which carry part of the apparatus is exactly compensated by an aluminium block, so that the dilatation of the crystal is measured directly, and comparatively thin crystals can be employed for the experiments.

EDINBURGH.

Royal Society, July 4.—Lord McLaren in the chair.—The Gunning Victoria Jubilee Prize for 1893-6 was presented to Mr. John Aitken, for his varied and important researches in the physics of meteorology. At the request of the Council, the Astronomer Royal for Scotland gave an address on the total solar eclipse of January 21, 1898, with some account of solar observation generally. Prof. Copeland began with a brief statement of what is now known concerning the sun's constitution, and indicated the lines along which an increase of knowledge might fairly be expected from observations of total eclipses. He then described the work his party had been able to accomplish during the recent eclipse. The photographs shown in illustration were chiefly from among those taken by himself and his assistants, and included several of the corona and protuberances and some fine spectrograms of the upper parts of the photosphere of the eclipsed sun. These were obtained with an instrument in which quartz prisms and lenses were used, and the spectral lines could be traced as far as Q. A careful examination would no doubt throw light on the heights reached by the various glowing vapours. The Astronomer Royal expressed his deep sense of gratitude to all who, both officially and privately, had facilitated his labours.—Dr. R. H. Traquair communicated three papers (1) on a new species of *Cephalaspis* found by the Geological Survey of Scotland in the Old Red Sandstone of Oban; (2) on *Thelodus Pagei* (Powrie) from the Old Red Sandstone of Forfarshire; (3) report on fossil fishes collected by the Geological Survey of Scotland on the Upper Silurian rocks of the Lesmahagow district. In this report four new genera and eight new species of fossil fish were described. The remains were in a remarkably good state of preservation, and threw a new light on several important biological problems. Thus certain scales, which had been previously described as sharks' teeth, were proved incontestably to belong to forms of *Thelodus*; and these forms also showed that Powrie's *Cephalopteris* was a *Thelodus* (subject of second paper). The characteristics of the new genera *Lanartia* and *Birkenia* were described at length, one peculiarity of the latter being the direction of the scales, which was from above downwards and forwards, instead of from above downwards and backwards, as in *Ganoids*.—Dr. W. Aitchison Robertson read a paper on the effect of mixed diet as regards salivary digestion. Among the results obtained may be mentioned the following: Porridge, especially if diluted with water or milk, was rapidly digested. Potatoes in a powdered state were also easily digested. Newly-baked bread was not so rapidly acted upon by saliva as stale bread, but the ultimate degree of starch conversion was greater in the former than in the latter. Alcohol retarded salivary digestion of starch, but not so much as infusion of tea. Wines had a marked inhibitory action; but beer aided digestion.

PARIS.

Academy of Sciences, July 18.—M. Wolf in the chair.—Researches on the relations which exist between luminous and chemical energy, by M. Berthelot. An experimental study of the action of sunlight upon concentrated nitric acid, iodic

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